I CLAIM:

1. A power generating system comprising:

a source of fresh, pure oxygen (O_2);

a gasifier, having a solid fuel inlet and a fresh, pure oxygen inlet, operating at an elevated pressure P_1 to convert the solid fuel to syngas, comprising carbon monoxide (CO) and hydrogen (H_2), and a solid residue comprising char;

a particle separator arranged in flow connection with said gasifier for separating the char particles from the syngas emanating from said gasifier;

a syngas combustor, having a fresh, pure oxygen inlet and an inlet for syngas discharged from the particle separator, for firing the syngas so as to produce exhaust gas comprising carbon dioxide (CO_2), water and excess oxygen;

a gas turbine arranged in flow connection with said syngas combustor, for expanding the exhaust gas so as to generate power with a generator connected to said gas turbine, and discharging expanded exhaust gas through an outlet of said gas turbine;

a steam generator, arranged in flow connection with said outlet of said gas turbine, comprising an outlet for discharging processed exhaust gas;

a gas compressor system having an inlet in flow connection with said outlet of said steam generator, and an outlet for discharging a stream of compressed exhaust gas; and

a first conductor that conducts a first portion of the stream of compressed exhaust gas to said gasifier to control the temperature in said gasifier, to provide CO_2 and steam for gasification, and to decrease the demand for fresh, pure oxygen therein.

2. A system according to claim 1, further comprising a second conductor that conducts a second portion of the stream of compressed exhaust gas to said syngas

combustor to control the temperature of said syngas combustor and to decrease the demand for fresh, pure oxygen therein.

3. A system according to claim 2, wherein said gas compressor system comprises a gas turbine compressor connected to an axis of said gas turbine, and a booster compressor, compressing the exhaust gas to a pressure of at least the pressure P_1 of said gasifier, said second conductor being connected to an outlet of said gas turbine compressor and conducting the second portion of the stream of compressed exhaust gas to said syngas combustor.

4. A system according to claim 3, wherein said gas turbine compressor comprises an interstage water injection system which reduces power demand of said gas compressor system and humidifies the stream of the compressed exhaust gas, thereby assisting NO_X control in said syngas combustor and enhancing gasification in said gasifier.

5. A system according to claim 1, further comprising a carbon dioxide condensing stage in flow connection with said outlet of said gas compressor system, for producing a stream of condensed CO_2 and a remaining stream comprising mainly O_2.

6. A system according to claim 5, further comprising a third conductor that conducts the remaining stream of mainly O_2 from said carbon dioxide condensation stage to said cryogenic air separator, and wherein said source of fresh, pure oxygen comprises a cryogenic air separator.

7. A system according to claim 1, further comprising a char-combusting boiler having an inlet for fresh, pure oxygen and char discharged from at least one of said

gasifier and said particle separator, to combust the char so as to produce steam, for generating power, and flue gas to be conducted to said inlet of said gas compressor system.

8. A system according to claim 7, wherein said char-combusting boiler is an atmospheric circulating fluidized bed boiler.

9. A system according to claim 7, wherein said steam generator comprises said char-combusting boiler.

10. A system according to claim 1, wherein said steam generator comprises a heat recovery steam generator.

11. A system according to claim 1, wherein said gasifier is a pressurized circulating fluidized bed gasifier.

12. A system according to claim 1, wherein said particle separator comprises at least one metal candle filter.

13. A method of generating power, comprising the steps of:

(a) supplying fresh, pure oxygen from an oxygen source;

(b) introducing solid fuel and fresh, pure oxygen to a gasifier and converting the solid fuel to syngas, comprising carbon monoxide (CO) and hydrogen (H_2), and a solid residue comprising char;

(c) conducting syngas emanating from the gasifier to a particle separator, and separating char particles from the syngas in the particle separator;

(d) firing syngas discharged from the particle separator with fresh, pure oxygen in a syngas combustor, and producing exhaust gas comprising carbon dioxide (CO_2), water and excess oxygen;

(e) expanding the exhaust gas in a gas turbine arranged in flow connection to the syngas combustor, generating power with a generator connected to the gas turbine, and discharging expanded exhaust gas through an outlet of the gas turbine;

(f) conducting expanded exhaust gas from the gas turbine to a steam generator and discharging processed exhaust gas through an outlet of the steam generator;

(g) introducing processed exhaust gas from the steam generator to an inlet of a gas compressor system, and producing a stream of compressed exhaust gas in the gas compressor system; and

(h) conducting a first portion of the stream of compressed exhaust gas to the gasifier to control the temperature in the gasifier, to provide CO_2 and steam for gasification, and to decrease the demand for fresh, pure oxygen therein.

14. A method according to claim 13, comprising the further step of:

(i) conducting a second portion of the stream of compressed exhaust gas to the syngas combustor, for controlling the temperature of the syngas combustor and for decreasing the demand for fresh, pure oxygen therein.

15. A method according to claim 14, wherein in step (g) the processed exhaust gas is first compressed in a gas turbine compressor, connected to the axis of the gas turbine, to a pressure P_2, and secondly in a booster compressor to a pressure of at least the pressure P_1 of the gasifier, and in step (i) the compressed exhaust gas is conducted from the gas turbine combustor, at the pressure P_2, to the syngas combustor.

16. A method according to claim 15, comprising the further step of:

(j) injecting water to the exhaust gas between stages of the gas turbine compressor, so as to reduce compression power demand and to humidify the stream of compressed exhaust gas, for assisting NO_X control in the syngas combustor, and for enhancing gasification in the gasifier.

17. A method according to claim 13, comprising the further step of:

(k) conducting a third portion of the stream of compressed exhaust gas to a carbon dioxide condensing stage and producing a stream of condensed carbon dioxide and a remaining stream comprising mainly oxygen.

18. A method according to claim 13, wherein the oxygen source is a cryogenic air separator, and the method comprises the further step of:

(l) conducting the stream comprising mainly oxygen from the carbon dioxide condensation stage to the oxygen source.

19. A method according to claim 13, comprising the further step of:

(m) producing steam, for generating power, and flue gas in a char-combusting boiler by combusting char discharged from at least one of the gasifier and the particle separator with fresh, pure oxygen, and conducting the flue gas to the inlet of the gas compressor system.

20. A method according to claim 19, wherein in step (f) the steam generator comprises the char-combusting boiler.

21. A method according to claim 13, wherein in step (f) the steam generator comprises a heat recovery steam generator.